

## **COMPREHENSIVE REVIEW OF ORGANIC FOODS THROUGHOUT THE WORLD**

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### **ABSTRACT**

Organic foods are produced without the use of conventional pesticides, synthetic fertilizers or sewage sludge and are processed without the application of ionizing radiation. The belief that organic foods are ‘healthier’ than conventionally-produced foods appears to be based on the perception that organic foods have superior sensory attributes, contain lower levels of pesticides and synthetic fertilizers and have higher levels of nutrients and protective phytochemicals.

Organic production, which is regulated and supported according to EU standards, is controlled, certified and labelled. Organic products tend to retail at a higher price than their conventionally grown/produced counterparts, mainly because of their lower yield and certification costs.

The data on organic agriculture available from 179 countries show that the global market for organic food in 2015 reached 81.6 billion US Dollars, with Switzerland having the highest per capita spending (221 Euros). According to the FiBL survey on organic rules and regulations, the number of countries with organic standards is 87. According to the IFOAM report, Turkey ranks fourth among 87 countries in terms of increasing organic farmland.

**Keywords:** Organic, Organic product, Organic agricultural production, Worldwide

### **1. INTRODUCTION**

Organic agriculture has been practiced since the 1920s, initially as a response to the industrialization of agriculture. Having evolved from an “alternative” movement to a major initiative for agricultural development, organic agriculture is now regulated by both nationally devised standards and EU criteria (Torjusen et al., 2001).

Organic agriculture is a production system that aims to sustain the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than on the use of inputs that have potentially adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promotes fair relationships and a good quality of life for all involved ( Misner and Florian, 2013, Cukur, 2015).

The four principles of organic agriculture are:

- It should sustain and enhance the health of the soil, plants, animals, humans, and the planet as one and indivisible.
- It should be based on living ecological systems and cycles, and work with them, emulate them and help sustain them.
- It should build on relationships that ensure fairness with regard to the common environment and life opportunities.
- It should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment (IFOAM 2016).

Organic foods are produced without the use of most conventional pesticides, synthetic fertilizers, or sewage sludge and are processed without the application of ionizing radiation. Production of organic foods must be free from genetically modified organisms, and organic poultry, eggs, meat, and dairy products must come from animals that were administered no antibiotics or growth hormones (Torjusen et al., 2001, Nguyen et al., 2016).

The consumers buy organic food because they expect that it is “good” for their health and has less impact on the environment and that the production process respects animal welfare principles (Kouba, 2003, Kriwy and Mecking 2012, Pino et al., 2012, Zagata 2012).

Recent food-related crises, such as mad cow disease and foot-and-mouth disease, have diminished consumer confidence in foods in general and more particularly in conventionally produced foods that use pesticides, antibiotics, and other chemicals in food production (Dreezens et al., 2005, Siderer et al., 2005).

Surveys indicate that many consumers purchase organic foods because of the perceived health and nutrition benefits of organic products. In one survey, it was shown that the main reasons consumers purchased organic foods were to avoid pesticides (70%), for its freshness (68%), for health and nutrition purposes (67%), and to avoid genetically modified foods (55%) Winter and Davis, 2006).

Advantages of organic farming;

- Reduced production costs due to not having to use expensive chemicals and fertilizers.
- Healthier farm workers.
- In the long term, organic farms save energy and protect the environment.
- Arrests the process of global warming.
- Fewer residues in food.
- Increased biodiversity, meaning more animals and plants can co-exist naturally in the same environment.
- Causes no pollution of ground water.

Disadvantages of organic farming;

- Organic food is more expensive because farmers do not get as much out of their land as conventional farmers do. Organic products may cost up to 40% more.
- Production costs are higher due to increased number of workers.
- Inefficient marketing and distribution as a result of organic food being produced in smaller amounts.
- Increased risk of food-related illnesses.
- Organic farming cannot produce enough food for the survival needs of the world's population, the results of which could lead to starvation in countries that today produce sufficient amounts of food to sustain their population (IFOAM, 2016).

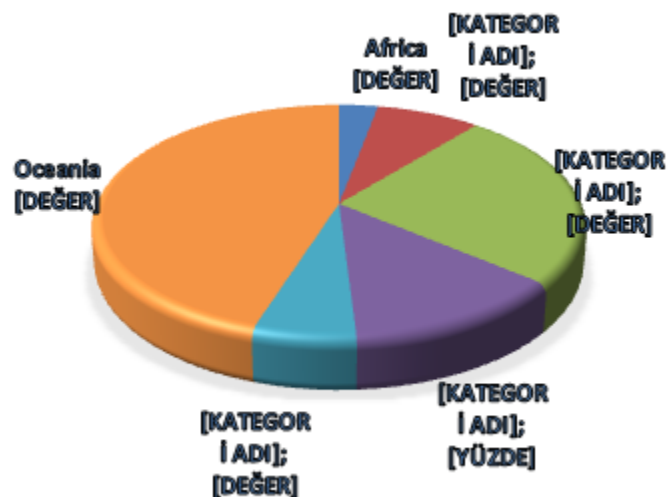
## **2. ORGANIC SECTOR**

According to the latest data on certified organic agriculture worldwide, data on organic agriculture was available from 179 countries (up from 172 in 2014). Brunei Darussalam, Cape Verde, Hong Kong, Kuwait, Monaco, Sierra Leone, and Somalia are new to the list of countries with organic data (Table 1). The end of 2015, a total of 50.9 million hectares were under organic agricultural management worldwide. Oceania has 45 percent (22.8 million hectares) and Europe (12.7 million hectares) has a 25 percent of the world's organic agricultural land followed by Latin America with 13 percent (6.7 million hectares) of the global organic agricultural land. (Fig.1) (IFOAM 2017).

**Table 1: Organic production in the world**

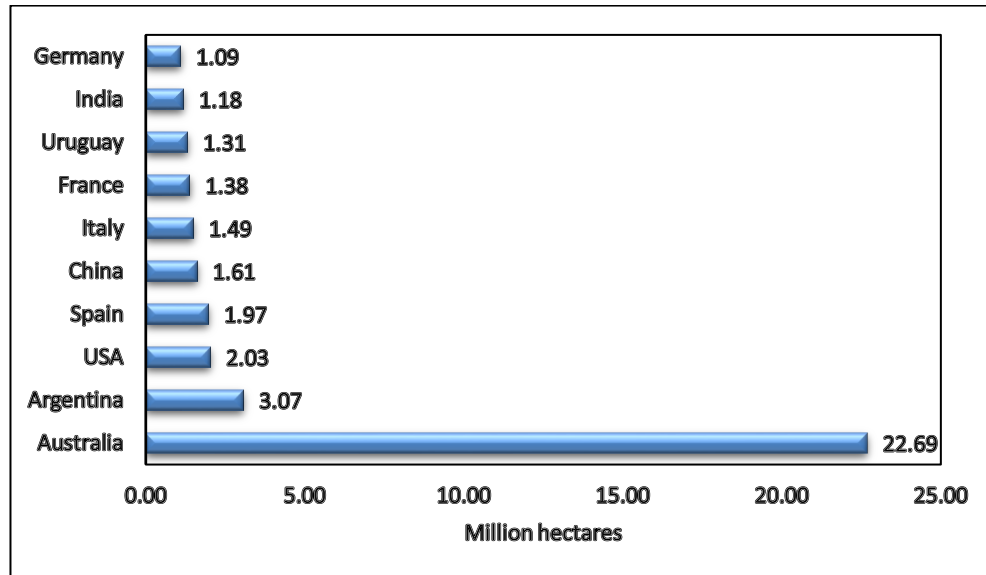
Indicator	World	Top countries
Countries with organic activities	2015:179 Countries	New countries: Brunei Darussalam, Cape Verde, Hong Kong, Kuwait, Monaco, Sierra Leone, Somalia
Organic agricultural land	2015:50.9 million hectares (1999: 11 million hectares)	Australia (22.7 million hectares;2013) Argentina(3.1 million hectares) USA (2.1 million hectares;2011)
Organic share of total agricultural land	2015:1.1%	Liechtenstein(30.2%) Austria(21.3%) Sweden (16.9% )
Wild collection and further, non-agricultural areas	2015:39.7 million hectares (1999:4.1 million hectares)	Finland (12.2 million hectares) Zambia (6.6 million hectares) India (3.7 million hectares)
Producers	2015:2.4 million producers (1999:200 000 producers)	India (585 200) Ethiopia (203 602) Mexico (200 039)
Organic market size	2015:81.6 billion US dollars (2000:17.9 billion US dollars)	USA (39.7 billion USD;35.8 billion euros) Germany (9.5 billion USD;8.6 billion euros) France (6.1 billion USD;5.5 billion euros)
Per capita consumption	2015:11.1 US dollars(10.3 deuro)	Switzerland (262 euros) Luxemburg (191 euros) Denmark (177 euros)
Number of countries with organic regulations	2016:87 countries	-
Number of IFOAM affiliates	2016:833 affiliates from 121 countries	Germany-91 affiliates China-73 affiliates India-55 affiliates USA-49 affiliates

Source: FIBL survey 2017.



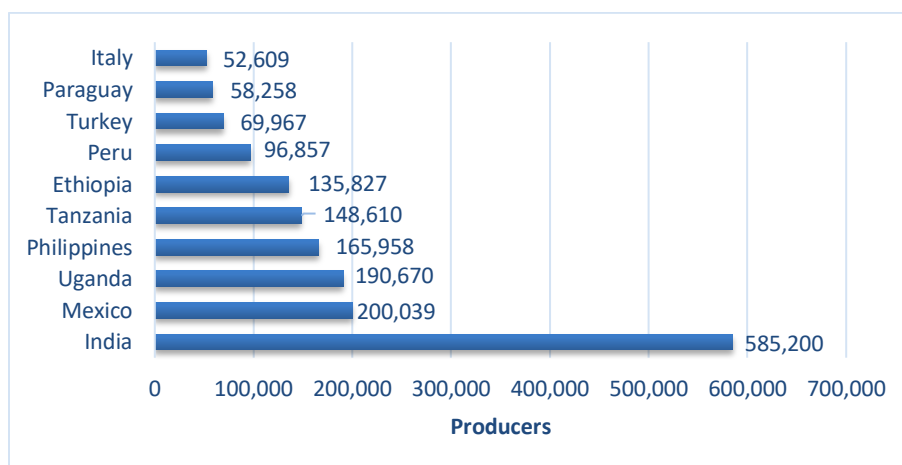
**Fig. 1: Region's shares of the global organic agricultural land (Source: FIBL survey 2017).**

Australia had the largest organic agricultural area (22.7 million hectares) followed by Argentina (3.1 million hectares) and the United States of America (2.1million hectares) (Fig.2). A total of 40 percent of the global organic agricultural land was in Oceania (22.8 million hectares), followed by Europe (27%; 12.7 million hectares) and Latin America (15%; 6.7 million hectares (Fig.3)(IFOAM 2017).



**Fig 2: Top ten countries with the largest areas of organic agricultural land**

(Source: FIBL survey 2017).



**Fig 3: Top ten countries with the largest number of organic producers**

(Source: FIBL survey 2017)

The highest organic shares of the total agricultural land, by region, are in Oceania(5.4 percent), Europe (2.5 percent) and European Union (6.2 percent). The countries with the largest share of organic agricultural land in terms of their total farmland were the Liechtenstein (30.2 percent), Austria (21.3 percent) and Sweden (16.9 percent). In eleven countries, 10 percent of the agricultural land is organic (Anonim, 2016a, IFOAM 2017). It was reported that in 2017, there were a world of 2.4 million producers. The countries with the most producers were India (585 200), Ethiopia (203 602) and Mexico (200 034) (IFOAM 2017).

The most important permanent crop is coffee (20 percent), followed by olives (0.7 million hectares), nuts (0.4 million hectares), tropical and subtropical fruits (0.3 million hectares) and grapes (0.3 million hectares) (IFOAM 2017).

There were 260 000 organic producers in the EU, with Italy having the largest number (approximately 49 000), and almost 340 000 in Europe, with Turkey boasting the most (over 71 000). The four biggest markets were Germany (8.6 billion euros), France (5.5 billion euros), the UK (2.3 billion euros) and Italy (2.1 billion euros). The initial market data available for 2015 show that growth continues in these large markets. In global terms, the US is the largest market (35.8 billion euros, with a per capita consumption of 85 euros in 2014), followed by Germany (IFOAM, 2017).

The end of 2015, 12.7 million hectares of agricultural land in Europe were managed organically by almost 350 000 producers. In Europe, 2.5 percent of the agricultural area was organic. Twenty five percent of the world's organic land is in Europe. The countries with the largest organic agricultural areas were Spain (2 million hectares), Italy (1.5 million hectares), and France (1.4 million hectares). In nine countries at least 10 percent of the farmland is organic; Liechtenstein has the lead (30.2 percent), followed by Austria(21.3 percent) and Sweden(16.9 percent). (IFOAM, 2017).

### **3. GLOBAL MARKET**

The market research company Organic Monitor had estimated that the global market for organic food would reach 81.6 billion US Dollars (more than 60 billion Euros) in 2015. The United States is the leading market with sales of 35.8 billion Euros, followed by Germany (8.6 billion Euros), France (5.5 billion Euros), and China (4.7 billion Euros) (IFOAM, 2017).

In Europe, 12.7 million hectares were organic in 2015. In Spain was the highest growth, the market increased by 25 percent. In Ireland, the market increased by 23 percent, and Sweden the market grew by 20 percent. There were almost 350 000 organic producers in Europe (EU:270 000) with the largest numbers in Turkey (70 000) and Italy (53 000). European consumers spent about 36.4 euros on organic food per person. The highest per capita consumption of organic food

in 2015 was in Switzerland (262 euros) followed by Denmark (191 euros), Sweden (177 euros) and Luxembourg (170 euros) (IFOAM, 2017).

The countries with the highest per capita organic consumption in 2015 were Switzerland, at 262 euros, followed by Denmark (191 euros), and Sweden (172 euros). The organic share of the total food market was highest in Denmark (8.4 %), Switzerland (7.7 %), Luxembourg (7.5 percent), and Sweden (7.3 percent) (IFOAM, 2017).

#### **4. LABELLING**

Organic certification has a long tradition in many European countries. Product labelling with organic certification logos is used to signal consumers at the point-of-sale that a product is a certified organic product. In the European Union (EU), products can be labelled and sold as organic food only if they comply with the principles of organic production, certification and labelling of Regulation (EC) No.834/2007 (and respective implementing regulations). Since July 2010, it has been required that all prepacked organic products produced and sold in the EU be labelled with the new mandatory EU logo (Regulation (EC) No. 834/2007) (Janssen and Hamn, 2011).

According to the FIBL survey on organic rules and regulations, the number of countries with organic standards is 87.

According to the EU organic farming regulation:

- Most of the ingredients must be of organic agricultural origin,
- Non-organic agricultural ingredients may be used only if they are authorized by the Commission or an EU country,
- Only small amounts of additives or processing aids may be used under certain conditions,
- No artificial flavorings and colorants may be used,
- Organic and non-organic food ingredients must be stored, handled and processed separately at all times (Anonim, 2016a).

The labelling requirements of the NOP apply to raw, fresh products and processed products that contain organic agricultural ingredients. These labeling requirements are based on the percentage of organic ingredients in a product. Products labeled “100% organic” must contain only organically produced ingredients and processing aids (excluding water and salt) (Anonim, 2016 a,b). Products labeled “organic” must consist of at least 95% organically processed ingredients (excluding water and salt); the remaining 5% of ingredients may be conventional or synthetic but must be on the USDA’s approved list. Processed products that contain at least 70% organic ingredients can use the phrase “made with organic ingredients” and list up to 3 of the organic

ingredients or food groups on the principal display panel. For example, soup made with at least 70% organic ingredients and only organic vegetables may be labeled either “soup made with organic peas, potatoes, and carrots” or “soup made with organic vegetables” (Forman and Silverstein, 2012).

## **5. COMPARATIVE STUDIES ON NUTRITIONAL VALUE**

Consumer studies continue to show that expectations concerning the health effects of organic food are about the strongest motives for consumers buying organic products, and research results on this topic point to high societal interest. The present review will evaluate the evidence for differences in the nutritional quality of conventionally-grown organic produce based on three types of study: nutrient analyses of crops grown under different conditions; health outcomes in controlled animal feeding studies; and observational and controlled intervention studies on human subjects (Huber et al., 2011).

The main conclusion drawn from these studies was;

- organic products had higher dry matter and lower nitrate content and contained less pesticide residues (Huber et al., 2011).
- A higher carotenoid content was found in organically grown sweet peppers, yellow plums, tomatoes and carrots (Chassy, et al., 2006, Lombardi-Boccia et al., 2004, Perez-Lopez et al., 2007)
- The content of phenolic compounds is higher in organic products (Huber et al., 2011).
- Higher levels of proteins and amino acids were found in the conventionally produced grain (Heaton, 2001, Worthington, 2001, Mader et al., 1993, Zorb et al., 2006).
- Regarding minerals, organic foods have been shown to have 21% more iron and 29% more magnesium than non-organic foods (Huber et al., 2011).
- Ascorbic acids were the most common vitamin found in higher quantities in many organic fruits and vegetables tested (Worthington, 2001).
- Milk from organically raised animals had higher contents of n-3 linolenic acids and conjugated linoleic acid (CLA) compared with milk from conventional systems (Bloksma et al., 2008, Butler et al., 2008).

## **6. CONCLUSIONS**

Organic foods are ‘healthier’ than conventionally-produced foods appear to be based on the perception that organic foods have superior sensory attributes, contain lower levels of pesticides and synthetic fertilizers and have higher levels of nutrients and protective phytochemicals.



Market demand for organic products has expanded, despite there being no demonstrable benefits possessed by organic foods that conventional foods do not also possess.

Consumers purchasing organic foods may do so for a number of reasons, including perceived benefits to the environment, animal welfare and worker safety, as well as the perception that organic foods are safer and more nutritious. People who consume organic food usually have a different lifestyle than that of conventional consumers. Factors such as living conditions, nutritional pattern, eating habits and sport are as important for human health as the quality of consumed food products.

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